Small Business Innovation Research/Small Business Tech Transfer

Low Profile Aerodynamic Testing Tape (LPATT), Phase I

Completed Technology Project (2018 - 2019)

Project Introduction

Current methods for obtaining pressure profiles on airfoils require complex pressure-scanner setups, which are expensive, very time-consuming, have multiple points of potential failure, and physically change the structure/loading on a test airfoil, especially in the case of smaller airfoils. This severely reduces the frequency at which such testing can be done, and the number of airfoils on which such testing can be practically performed.

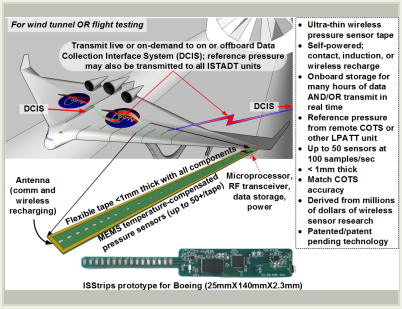
To address these issues, IEM proposes the **Low Profile Aerodynamic Testing Tape (LPATT)** derived from and building upon ***millions of dollars*** in miniature wireless sensor research and ***patented and patent-pending*** technology and innovations. LPATT will be an ***ultra-thin, easily applied pressure and temperature wireless sensor node*** (***other sensing parameters possible***) that can be ***applied*** in any location with minimal time and effort and ***NO modifications*** to the airframe of any kind, with ***minimal impact*** on airstream passage. LPATT will ***match or exceed*** current-technology measurement accuracy, be ***self-powered,*** will ***store all information onboard*** and be capable of either ***real-time transmission*** of data **or** of transmitting the data ***later on demand***, and may be designed with 50 or more pressure sensors with high sampling rates. Data interface between LPATT will be accomplished using a ***Data Collection Interface System (DCIS)*** to collect, process, and transmit data to outside systems.

The use of LPATT will ***drastically reduce the cost and time*** involved in wind-tunnel and flight test pressure sensing trials and may offer ***direct benefits in other areas*** such as providing the data for operation of ***performance adaptive aeroelastic wing shape control***s in future aircraft designs. IEM will work with ***Dr. Michael Amitay of Rensselaer Polytechnic Institute***, who will provide access to and expertise with a functional laboratory wind tunnel for tests and demonstrations of LPATT prototypes.

Anticipated Benefits

It is expected that with the head-start from related projects such as ISStrips IEM will be able to take LPATT to a TRL of 4-5 in Phase I and a **TRL of 7 in Phase II**. NASA customers for the completed LPATT include Ames, Langley, Glenn, and other installations with aerodynamic research and development that include significant wind tunnel operations and possibly flight testing, where a great deal of time and effort can be saved in the installation and operation of pressure profiling equipment.

Commercial and military aircraft developers and manufacturers



Low Profile Aerodynamic Testing Tape (LPATT), Phase I

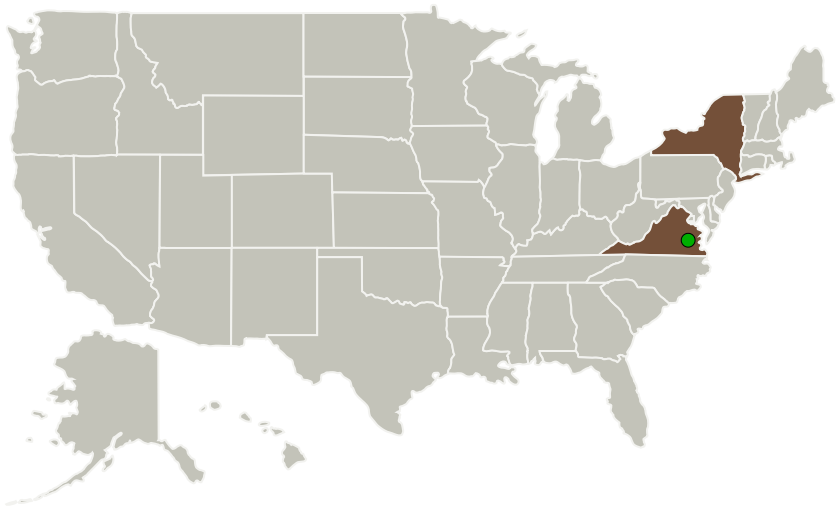
Table of Contents

Low Profile Aerodynamic Testing Tape (LPATT), Phase I

Completed Technology Project (2018 - 2019)

represent a larger market, and one that stands to save a ***huge amount of time and money*** from such a system. According to Mark Goldhammer, a former Chief Engineer at Boeing's commercial aircraft division, preparations for large-scale wind tunnel tests using standard pressure scanners cost in the range of ***one million dollars*** per test, due to the time and effort of installing the pressure measurement system.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
International Electronic Machines Corporation(IEM)	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Troy, New York
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
New York	Virginia

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

International Electronic Machines Corporation (IEM)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

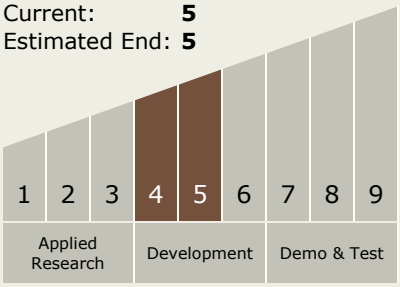
Carlos Torrez

Principal Investigator:

Bruce Mckenney

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



Low Profile Aerodynamic Testing Tape (LPATT), Phase I

Completed Technology Project (2018 - 2019)

Project Transitions

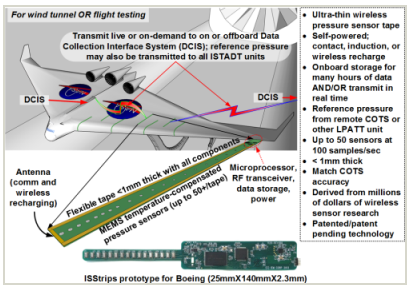
July 2018: Project Start

February 2019: Closed out

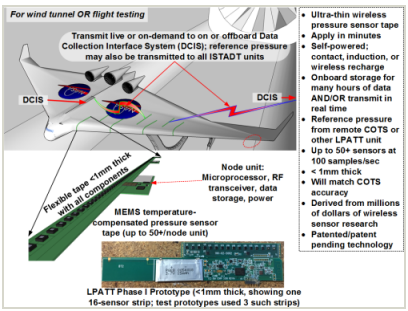
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137855)*

Images



Briefing Chart Image
Low Profile Aerodynamic Testing Tape (LPATT), Phase I *(https://techport.nasa.gov/image/135709)*



Final Summary Chart Image
Low Profile Aerodynamic Testing Tape (LPATT), Phase I *(https://techport.nasa.gov/image/130573)*

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.8 Ground and Flight Test Technologies

Target Destination

Earth